

and *P. fallax*, only *P. fallax* was found at the same locality as the hybrid.—LETICIA PACHECO, ANDRÉS SÁNCHEZ MORALES & CARMEN DE LA PAZ PÉREZ OLVERA, Universidad Autónoma Metropolitana—Iztapalapa, Depto. de Biología, Área de Botánica Estructural y Sistemática Vegetal, Apdo. Postal 55-535, 09340 México, D. F. México.

Forcing Autumnal Growth of *Ophioglossum*.—*Ophioglossum engelmannii* Prantl. is a spring fern that grows in calcareous soils. In middle Tennessee large numbers of this fern are found in cedar glades growing in thin soil over horizontally-bedded Ordovician limestone. Mature leaves develop in April and spores are released from fertile spikes in May. After the dehiscence of the sporangia, the leaves die back and the underground portions of these plants become dormant in June.

There are reports that a second set of leaves occasionally appears in the fall. This late growth is associated with wet autumns and was first reported by Palmer (Amer. Fern J. 22:43–47, 1932). Couch (Proc. Okla. Acad. Sci. 17:58, 1937) confirmed this observation in Oklahoma and also reported that the autumnal plants remained above ground into November and they had sporangia that released spores. Magrath and Weedon (Amer. Fern J. 62:22–23, 1972) extended these observations by comparing leaf and fertile spike development in the fall of one year with that of the next spring. They found that 13.9% of the plants produced fertile spikes in the autumn compared with 23.4% in the spring and they concluded that fall-fruiting may not be uncommon for *O. engelmannii* in Kansas.

In a detailed study on the ecology of this species, Baskin and Baskin (Amer. Fern J. 24:65–71, 1974) reported that plants growing during years with typical amounts of rainfall in Tennessee and Kentucky produced very few leaves and even fewer fertile spikes in the fall. They also found, as in the previous reports, that high soil moisture was important for the emergence of more plants during wetter autumns.

In an effort to show participants of a fern foray in middle Tennessee as many pteridophytes as possible and some interesting habitats, a cedar glade in Rutherford County was included as one of the foray stops. The two species of most interest that grow in this cedar glade are *Isoetes butleri* Engelm. and *O. engelmannii*. Unfortunately, *I. butleri* is dormant in the fall and *O. engelmannii*, as noted previously, rarely has leaves above ground in the typical late summer and fall of this region. However, a wet late season would increase the possibility of *O. engelmannii* being above ground for the foray in early October.

It was a dry summer in 1987 and it appeared that the weather was not going to change during the late summer and early autumn. Unless it rained, the foray participants would see other botanical aspects of a cedar glade during a dry autumn and this would consist of herbaceous plants with the ability to withstand dry conditions and a few woody plants. For this reason it was

decided to water the areas known to have patches of *O. engelmannii* in an effort to promote a late season growth of these plants.

As it turned out, this was a good decision because there was no rain at the cedar glade from late August to late October. Three areas with high densities of dormant *O. engelmannii* were each watered with three gallons of water for four weekends in September and October prior to the foray. The water was obtained from a nearby lake and poured on the three areas.

Watering brought large numbers of leaves above ground for the foray. Along with the leaves, some plants had early stages of fertile spike development. In unwatered areas the plants of *O. engelmannii* remained dormant. Because there are no reports that *I. butleri* breaks dormancy during wet autumns, no effort was made to force them to grow.

Besides providing the foray participants with another fern for examination, this test demonstrated that *O. engelmannii* could be forced to grow in the autumn during dry years if water was supplied. This supports the earlier conclusions that wet or moist soil allows these plants to have a second season of growth. It does not appear to matter whether the soil is kept moist by rain or watering for this to happen.—DEAN P. WHITTIER, Department of Biological Sciences, Box 1634, Vanderbilt University, Nashville, TN 37235-1634.